

# Temperature sensors and accessories for hot and cooling measuring points

## Applications

Temperature sensors are integral components of every hot or cooling measuring point. They are used for determining temperature changes in fluids due to energy taken from or supplied to the loop. The temperature is thus measured by mounting temperature sensors upstream and downstream from the point where there is a change in the heat energy of the system.

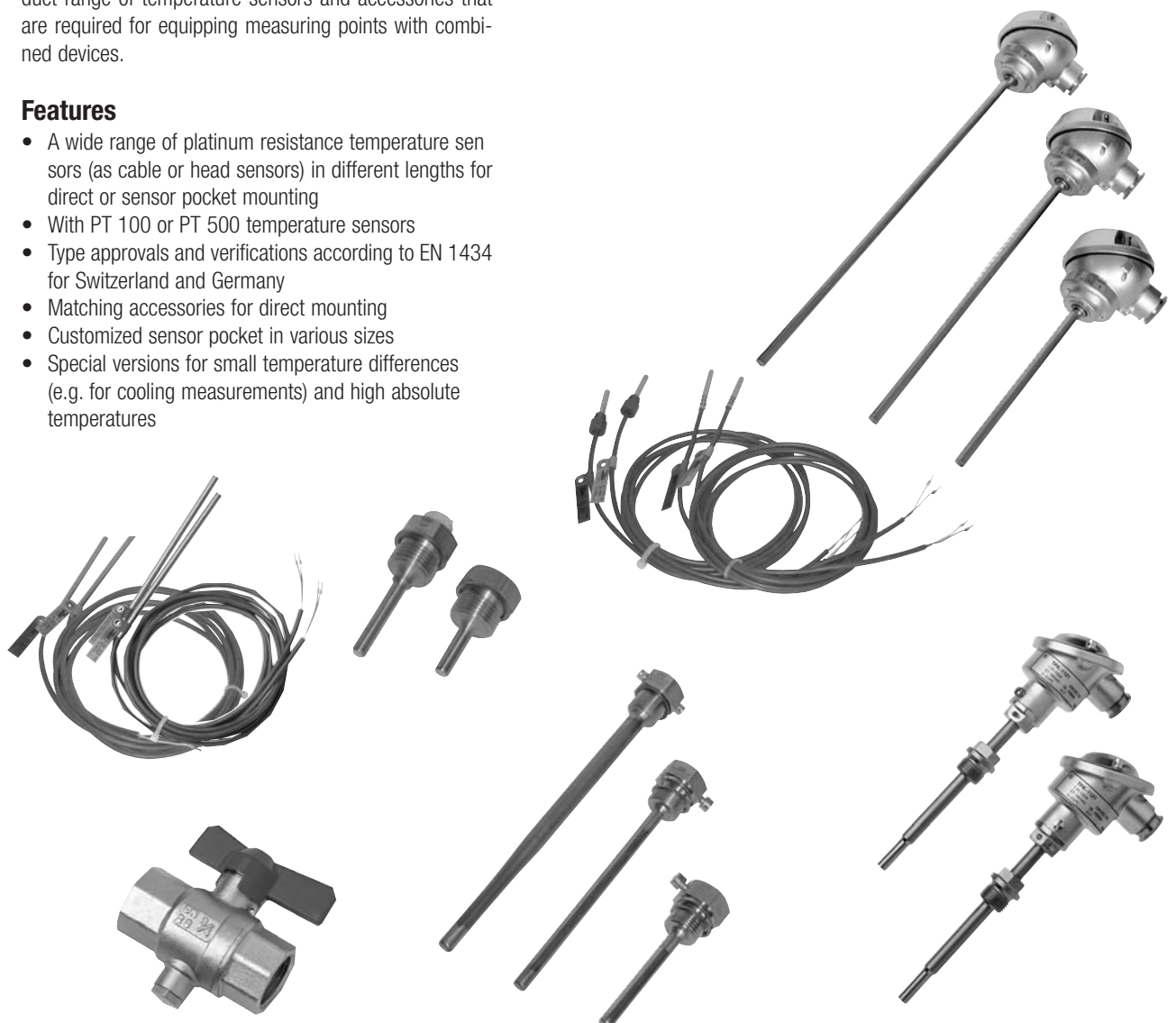
Heat or cooling meters are available as either complete or combined units. In contrast to complete devices, combined instruments are made up of individual components consisting of a flowmeter, totalizer and two temperature sensors. This data sheet presents the AQUAMETRO product range of temperature sensors and accessories that are required for equipping measuring points with combined devices.

## Features

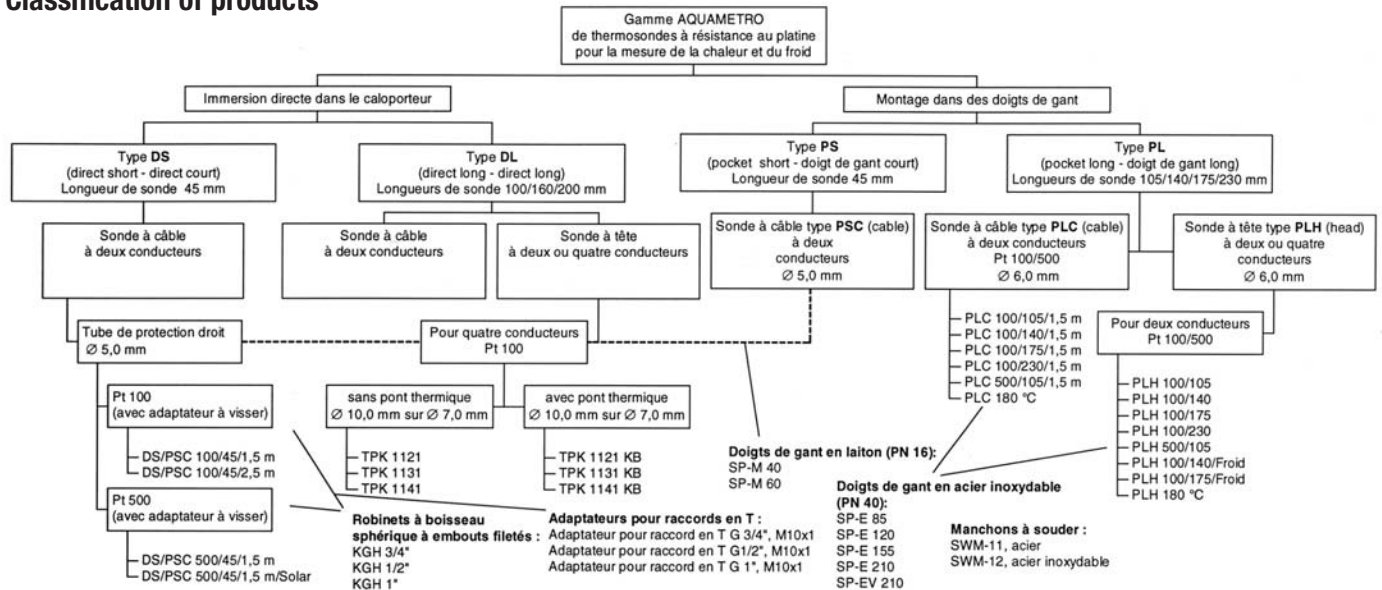
- A wide range of platinum resistance temperature sensors (as cable or head sensors) in different lengths for direct or sensor pocket mounting
- With PT 100 or PT 500 temperature sensors
- Type approvals and verifications according to EN 1434 for Switzerland and Germany
- Matching accessories for direct mounting
- Customized sensor pocket in various sizes
- Special versions for small temperature differences (e.g. for cooling measurements) and high absolute temperatures

## Benefits

- Optimised and EN 1434 approved product range ideal for hot and cooling measurements
- Matching hot and cooling measurement components from Aquametro ensuring high accuracy over long periods of time
- Low inventory management with the same temperature sensors used for direct or sensor pocket mounting (DS/PSC)
- Direct mounting of DS/PSC temperature sensors without separate accessories
- Standard compliant and internationally accepted designation



## Classification of products



### Key for temperature sensors

Type of Pt value / length / other features

Type	DS/PSC or PLC or PLH
Pt type	100 or 500
Length	Sensor length 45/105/140/175/230 mm
Cable length	1.5 m or 2.5 m
Features	Solar / 180 °C / cooling

### Key for sensor pockets

SP material/face-to-face length

SP	Sensor pocket
Material	Brass (M) or stainless steel (E) or reinforced stainless steel (EV)
Face-to-face lengths	40/60/85/120/155/175/210 mm

### Standards and Directives

- European standard for heat meters EN 1434
- National recommendations on applications:
  - Germany, e.g. legislation on district heating
  - Worksheet FW 202, 207 and 211
- IEC 751: Platinum resistor thermometers

### Supplementary Aquametro Documentation

- Technical Information, No. 11776

## Temperature sensors DS/PSC and accessories

### Description

- Cable temperature sensors for direct (**D**irect **S**hort) and pocket (**P**ocket **S**hort **C**able) mounting with Pt 100 and Pt 500, sensor diameter 5 mm, sensor length 45 mm
- Brass sensor pockets
- Ball valves for temperature sensors
- Adapter for T-pieces

### Applications

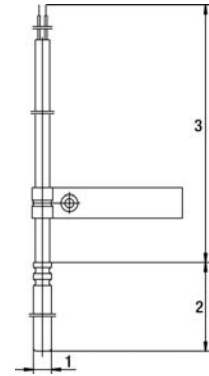
- Recommended for piping up to DN 50 for direct and pocket mounting
- According to international heat meter standard EN 1434-2, direct mounting into piping up to DN 50 is recommended over pocket installation
- Interchangeable, e.g. for AQUAMETRO meters AMTRON® NW, CALEC® ST, CALEC® light and CALEC® MB for piping up to DN 50 mm

### Note

- There must be mounting symmetry of both temperature sensors, i.e. both sensors must be identically mounted, e.g. both in ball valves (and not one sensor in a pocket and the other directly mounted in a ball valve or T-piece)
- For direct installing of temperature sensors, only matching T-pieces are to be used. This ensures that no unnecessary measurement errors occur due to unequal immersion depths.

## Technical data

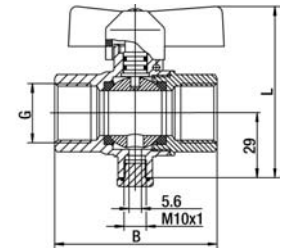
Sensor type	Two-wire connection, Pt100 and Pt500
Protective tube	Stainless steel
Temperature range	0 to 150 °C
Connector	Silicon
Matched pairs at	10 °C, 65 °C, 120 °C
Tolerance class to IEC 751	Class B
Diameter of protective tube <sup>1</sup>	5 mm
Material of protective tube	1.4571 (316Ti)
Length of sensor <sup>2</sup>	45 mm
Immersion depth	27.5 mm
Connection wire terminals	Terminal sleeves to DIN 46 228 Part 4
Connection wire lengths <sup>3</sup>	500 mm and 2 500 mm
Type approval	EN 1434 for Switzerland and Germany
Permissible range for temperature differences	3 K – 150 K
Verification	As required for Switzerland and Germany



## Accessories

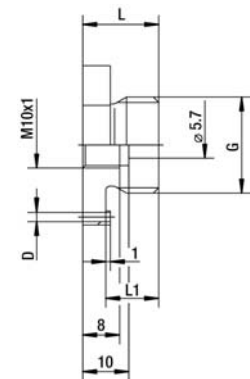
### Ball valve for temperature sensor mounting

Threaded ends	Internal thread G 1/2" or 3/4" and 1"		
Connection piece	M 10x1 to EN 1434		
Material	Nickel-plated brass		
Maximum media temperature	150 °C		
Pressure rating	PN 16		
Dimensions	G 1/2"	G 3/4"	G 1"
L	77 mm	77 mm	84 mm
B	64 mm	73 mm	85.5 mm



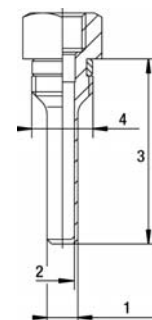
### Adapter for mounting in T-pieces

Thread	External thread G 1/2", 3/4" or 1"		
Connection piece	M 10x1 to EN 1434		
Material	Brass		
Dimensions	G 1/2"	G 3/4"	G 1"
L	16.5 mm	20 mm	20 mm
L1	11.5 mm	14 mm	14 mm
D	2 mm	-	-



### Sensor pockets with M 10x1 thread, parallel protective tube

Internal diameter of protective tube <sup>2</sup>	5 mm
Face-to-face length <sup>3</sup>	40 mm and 60 mm
Process connection	External thread G 1/2"
Material	Brass
Pressure rating	PN 16
External diameter <sup>1</sup>	Ø 6.6 mm



## Product range

Part	Description	Quantity and packaging	Art.-No.
DS/PSC 100/45/1,5 m	Pair of Pt 100,cable sensors, sensor length 45 mm, connecting cable 1.5 m	Paired, bag-packed with threaded adapters for direct mounting, with installation instructions	80068
DS/PSC 100/45/2,5 m	Pair of Pt 100,cable sensors, sensor length 45 mm, connecting cable 2.5 m	Paired, bag-packed with threaded adapters for direct mounting, with installation instructions	80069
DS/PSC 500/45/1,5 m	Pair of Pt 500,cable sensors, sensor length 45 mm, connecting cable 1.5 m	Paired, bag-packed with threaded adapters for direct Direkteinbau und Montageanleitung	80066
DS/PSC 500/45/1,5 m Solar	Pair of Pt 500 cable sensors, sensor length 45 mm, connecting cable 1.5 m, for solar applications	Paired, bag-packed with threaded adapters for direct mounting, with installation instructions	19889
KGH 1/2"	Ball valve 1/2" for inserting sensor	Single, unpacked	2505
KGH 3/4"	Ball valve 3/4" for inserting sensor	Single, unpacked	2504
KGH 1"	Ball valve 1" for inserting sensor	Single, unpacked	2507
T-piece adapter G 1/2"/M10x1	Adapter for G 1/2" T-piece for inserting sensor, M 10x1	Single, bag-packed, with copper sealing ring	80072
T-piece adapter G 3/4"/M10x1	Adapter for G 3/4" T-piece for inserting sensor, M 10x1	Single, bag-packed, with copper sealing ring	80073
T-piece adapter G 1"/M10x1	Adapter for G 1" T-piece for inserting sensor, M 10x1	Single, bag-packed, with copper sealing ring	80074
SP-M 40	Pair of brass sensor pockets, face-to-face length 40 mm	Paired, bag-packed, with copper sealing ring	80075
SP- M 60	Pair of brass sensor pockets, face-to-face length 60 mm	Paired, bag-packed, with two hasp screws, installation instructions	80076

## TPK sensor heads with 4-wire connection

### Description

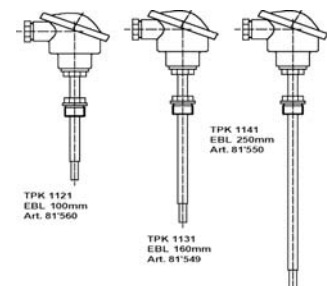
- Pt 100 head sensor with 4-wire connection for direct mounting, with or without cold bridges
- Sensor lengths 100 mm, 160 mm and 250 mm

### Applications

- For high pressures, large temperature ranges and due to high mechanical stability long face-to-face lengths
- 4-wire connection right up to the measuring element
- The "cold bridge" version to be used for low temperature applications

### Technical data

Resistance values	IEC 751 with the Pt 100 basic values
Temperature measuring range	0...180 °C (250 °C)
Absolute deviation from IEC 750 theoretical values	< +/- 0.5 K/40 °C
Max deviation of a matched sensor pair	In the temperature range 0... 130 °C: 30 mΩ
Mean gradient tolerance against the IEC 751 curve	At 40 °C/80 °C and 80 °C/130 °C: max. 5 mmΩ /Ω
Insulation resistance between measurement resistor and sensor pipe	> 1 MW
Mounting thread	G 1/2", AF 19 mm
Sensor pipe	Ø 7 mm tip, Ø 10 mm shaft, material CrNiMo
Face-to-face lengths	100 mm, 160 mm, and 250 mm
Total length	= sensor length + 125 mm
Pressure rating	PN 40 bar
Connection head	DIN-B aluminium head
Measuring insert	Interchangeable



## Product range

Part	Description	Quantity and packaging	Art.-No.
TPK 1121	Pair of head sensors, 4-wire connection, face-to-face length 100 mm	Paired, bag-packed	81560
TPK 1131	Pair of head sensors, 4-wire connection, face-to-face length 160 mm	Paired, bag-packed	81549
TPK 1141	Pair of head sensors, 4-wire connection, face-to-face length 250 mm	Paired, bag-packed	81550
TPK 1121 with cold bridge	Pair of head sensors with cold bridge, 4-wire connection, face-to-face length 100 mm	Paired, bag-packed	81670
TPK 1131 with cold bridge	Pair of head sensors with cold bridge, 4-wire connection, face-to-face length 160 mm	Paired, bag-packed	81671
TPK 1141 with cold bridge	Pair of head sensors with cold bridge, 4-wire connection, face-to-face length 250 mm	Paired, bag-packed	81672

## PLC temperature sensors

### Description

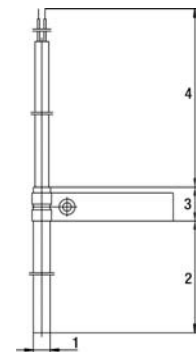
- Cable temperature sensor for mounting in a pocket (**Pocket Long Cable**), types Pt 100 and Pt 500, sensor diameter 6 mm, sensor lengths 105 mm, 140 mm, 175 mm and 230 mm
- Special versions for high absolute temperatures up to 180 °C

### Applications

- For facilities with pipe diameters from approx. DN 50 upwards
- Good thermal properties with low heat loss
- Two-wire connection but can be converted to four-wire using a sealed distributor box
- Used with SP sensor pockets (see accessories for PLC and PLH temperature sensors)

### Technical data

Sensor type	Two-wire connection Pt100 and Pt500
Protective tube	Stainless steel
Temperature range	0 to 150 °C (180 °C)
Connector	Silicon
Matched pairs at (standard 150 °C)	10 °C, 65 °C, 120 °C
Matched pairs at (for 180 °C)	10 °C, 80 °C, 150 °C
Tolerance class to IEC 751	Class B
Diameter of protective tube <sup>1</sup>	6 mm
Material of protective tube	1.4571 (316Ti)
Sensor lengths <sup>2</sup>	105 mm, 140 mm, 175 mm and 230 mm
Connection wire terminals	terminal sleeves to DIN 46 228 Part 4
Connection wire lengths <sup>4</sup>	2 500 mm
Dimensions <sup>3</sup>	15 mm
Permissible range for	3 K – 150 K
Type approval	EN 1434 for Switzerland and Germany
Permissible range for temperature differences	3 K – 150 K (180 K)
Verification	On request for Switzerland and Germany



## Product range

Part	Description	Quantity and packaging	Art.-No.
PLC 100/105/1,5 m	Pair of cable sensors for pocket mounting, Pt 100, sensor length 105 mm, connecting cable 1.5 m	Paired, bag-packed	80058
PLC 100/140/1,5 m	Pair of cable sensors for pocket mounting, Pt 100, sensor length 140 mm, connecting cable 1.5 m	Paired, bag-packed	80061
PLC 100/175/1,5 m	Pair of cable sensors for pocket mounting, Pt 100, sensor length 175 mm, connecting cable 1.5 m	Paired, bag-packed	80067
PLC 100/230/1,5 m	Pair of cable sensors for pocket mounting, Pt 100, sensor length 230 mm, connecting cable 1.5 m	Paired, bag-packed	80063
PLC 500/105/1,5 m	Pair of cable sensors for pocket mounting, Pt 500, sensor length 105 mm, connecting cable 1.5 m	Paired, bag-packed	80065
PLC 180 °C	Pair of cable sensors for pocket mounting, for temperatures up to 180 °C, Pt 100, sensor length 105 mm, 140 mm, 175 mm, 230 mm	Paired, bag-packed	180413

## PLH temperature sensor

### Description

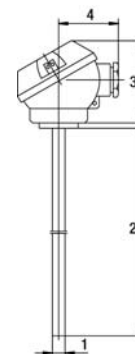
- Head sensor for pocket mounting (**P**ocket **L**ong **H**ead) types Pt 100 and Pt 500, sensor diameter 6 mm, sensor lengths 105mm, 140 mm, 175 mm and 230 mm
- Special versions for low temperature differences (e.g. for cooling measurements) and high absolute temperatures up to 180 °C

### Applications

- For facilities with pipe diameters from approx. DN 50 upwards
- Good thermal properties with low heat loss
- Two-wire connection but can be converted to four-wire by connecting directly to the sensor head
- Used with SP sensor pockets (see accessories for PLC and PLH temperature sensors)

### Technical data

Sensor type	Two-wire connection Pt100 and Pt500
Protective tube	Stainless steel
Temperature range	0 to 150 °C (180 °C)
Connecting head	Metal, version PL
Matched pairs at (standard 150 °C)	10 °C, 65 °C, 120 °C
Matched pairs at (cooling applications)	(0 °C), 10 °C, 30 °C, 50 °C
Matched pairs at (180 °C)	10 °C, 80 °C, 150 °C
Tolerance class to IEC 751	Class B
Diameter of protective tube <sup>1</sup>	6 mm
Material of protective tube	1.4571 (316Ti)
Sensor lengths <sup>2</sup>	105 mm, 140 mm, 175 mm and 230 mm
Height of sensor head <sup>3</sup>	44.5 mm
Dimensions <sup>4</sup>	33 mm
Type approval	EN 1434 for Switzerland and Germany
Permissible range for temperature differences	3 K – 150 K (180 K)
Verification	On request for Switzerland and Germany



## Product range

Part	Description	Quantity and packaging	Art.-No.
PLH 100/105	Pair of head sensors, for pocket mounting, Pt 100, sensor length 105 mm	Paired, bag-packed	80070
PLH 100/140	Pair of head sensors, for pocket mounting, Pt 100, sensor length 140 mm	Paired, bag-packed	80078
PLH 100/175	Pair of head sensors, for pocket mounting, Pt 100, sensor length 175 mm	Paired, bag-packed	80079
PLH 100/230	Pair of head sensors, for pocket mounting, Pt 100, sensor length 230 mm	Paired, bag-packed	80080
PLH 500/105	Pair of head sensors, for pocket , mounting, Pt 500, sensor length 105 mm	Paired, bag-packed	80081
PLH 100/140/Cold	Pair of head sensors, for pocket mounting, for cooling measurements, Pt 100, sensor length 140 mm	Paired, bag-packed	80085
PLH 100/175/Cold	Pair of head sensors, for pocket mounting, for cooling measurements, Pt 100, sensor length 175 mm	Paired, bag-packed	80086
PLH 180 °C	Pair of head sensors, for pocket mounting, for measurements up to 180 °C, Pt 100, sensor lengths 105 mm, 140 mm, 175 mm and 210 mm	Paired, bag-packed	180412

## Accessories for PLC and PLH temperature sensors

### Description

- Stainless steel sensor pockets, face-to-face lengths 85 mm, 120 mm, 155 mm and 210 mm for PN 40
- Reinforced 210 mm sensor pocket for flows greater than 2 m/s
- Distributor box for converting from two- to four-wire connections

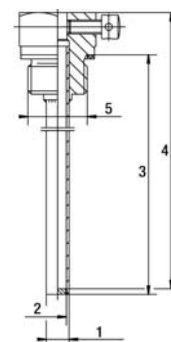
### Note

The face-to-face sensor pocket length for PLC and PLH sensors must be 20 mm shorter than the length of the sensor itself. This is shown in the table below:

Length of the PLC and PLH sensors	Face-to-face length of the sensor pocket
105 mm	85 mm
140 mm	120 mm
175 mm	155 mm
230 mm	210 mm

### Technical data

External diameter <sup>1</sup>	8 mm
Protective tube internal diameter <sup>2</sup>	6 mm
With sealing screw	
Maximum temperature	200 °C
Pressure rating	PN 40
Thread <sup>5</sup>	G 1/2"
Length <sup>4</sup>	98 mm, 133 mm, 168 mm and 223 mm
Face-to-face length <sup>3</sup>	85 mm, 120 mm, 155 mm and 210 mm
Material of protective tube	1.4571 (316Ti)



## Product range

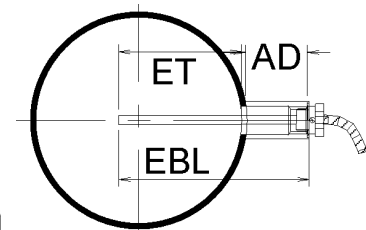
Part	Description	Quantity and packaging	Art.-No.
SP-E 85	Stainless steel sensor pocket, G 1/2", face-to-face length 85 mm, PN 40	Single, with copper seal ring, bag-packed	80059
SP-E 120	Stainless steel sensor pocket, G 1/2", face-to-face length 120 mm, PN 40	Single, with copper seal ring, bag-packed	80060
SP-E 155	Stainless steel sensor pocket, G 1/2", face-to-face length 155 mm, PN 40	Single, with copper seal ring, bag-packed	80062
SP-E 210	Stainless steel sensor pocket, G 1/2", face-to-face length 210 mm, PN 40	Single, with copper seal ring, bag-packed	80064
SP-EV 210	Stainless steel sensor pocket, reinforced for $v > 2$ m/s, G 1/2", face-to-face length 210 mm, PN 40	Single, with copper seal ring, bag-packed	80077
SWM-11	Steel welding socket G1/2"	Single	81551
SWM-12	Stainless steel welding socket G1/2"	Single	81552
VD 30	Connection box for cable extension	Single, bag-packed with installation instructions	93331

## Face-to-face selection table for Aquametro temperature sensors

Brass sensor pockets	SP-M 40			SP-M 60		
	Face-to-face length EBL	Immersion depth ET	External length AD	Face-to-face length EBL	Immersion depth ET	External length AD
Tube DN						
15	40	22.5	17.5			
20	40	25	15	60	25	35
25				60	27.5	32.5
32				60	31	29
40				60	35	25
50				60	40	20
60				60	45	15

TPK head sensors	1121			1131			1141		
	Face-to-face length EBL	Immersion depth ET	External length AD	Face-to-face length EBL	Immersion depth ET	External length AD	Face-to-face length EBL	Immersion depth ET	External length AD
Tube DN									
50	100	45	35						
60	100	50	50						
80	100	60	40						
100	100	70	30						
125				160	82.5	77.5			
150				160	95	65			
200				160	120	40			
250							250	145	105
300							250	170	80
400							250	220	30

Stainless steel sensor pockets	SP-E 85			SP-E 120			SP-E 155 SP-E/V 210		
	Face-to-face length EBL	Immersion depth ET	External length AD	Face-to-face length EBL	Immersion depth ET	External length AD	Face-to-face length EBL	Immersion depth ET	External length AD
Tube DN									
50	85	40	45						
60	85	50	35						
80	85	60	25						
100	85	70	15	120	70	50			
125				120	82.5	37.5			
150				120	95	25			
200							155	95	60
250							155	120	35
300							210	145	65
							210	170	40



### Selecting the face-to-face length (EBL):

1. Determine the tube diameter
2. Select the type of mounting
3. Take into account the insulation thickness
4. Select the face-to-face length (EBL) which gives the external length (AD) required (AD).

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